1879.

BOROUGH OF CARDIFF.

THE

OFFICER OF HEALTH'S REPORT

ON THE

Sanitary Condition of Cardiff,

DURING THE YEAR, 1878,

BY

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CARDIFF:

J. L. BATTEN, (LATE S. ALLEN,)

292, BUTE STREET.

TO THE

CARDIFF LOCAL BOARD OF HEALTH.

Cardiff, March 25th, 1879.

To the Cardiff Urban Sanitary Authority.

GENTLEMEN,

On bringing before your notice the Sanitary condition of this District during the past year, it is satisfactory to be able to state that the progressive improvement which marked the history of 1876 and 1877, was maintained throughout the whole of 1878.

The various influences which, to a greater or lesser degree, effect the public health may be considered as follows :—

1. Those which are due to natural causes, entirely independent of a Sanitary Authority.

2. Those which are due to the special condition of a locality, and which are amenable to Sanitary provisions.

3. Those which are associated with the habits and manners of living of the individual, and are partly subject to sanitary control, especially if aided by the co-operation of those immediately effected by these causes.

Amongst the first section, meteorological influences exercise no unimportant effect on the public health; these influences are direct, and also collateral. The popular mind recognises the fact that at particular seasons, the mortality among the aged is excessive; during the past year I have from time to time, in the reports which I have presented to your board, called your attention to an excess of mortality from acute

inflammatory affections of the pulmonary organs, and attributed this to the severity of the prevailing weather; this was especially the case during the months of November and December. These are instances of direct influence; but it is of more importance that a correct estimate of meteorological influences should be recognised when these are collateral. It has been stated by a very high authority that zymotic diseases are mainly due to preventable causes, and that when a high rate of mortality has been occasioned by these diseases, it indicates defective sanitary arrangement, this principle is true but not entirely so—there are occasions when undue mortality from zymotic diseases may be high and yet sanitary provisions are well maintained, thus:—Infantile epidemics, such as measles and whooping cough, in the ordinary course of nature spread amongst children; when these epidemics appear in the later spring, the genial summer, or the early autumn, the mortality which ensues bears no comparison in extent to that which follows an outbreak in the more unfavourable season of winter.

METEOROLOGY.

The Meteorology of the year was as follows:—

The Rainfall of the year 1878, as observed by Mr. W. Adams, C.E., F.G.S., at his residence, No. 53, Crockherbtown, is shown by the subjoined table:—

Latitude, N. 51deg., 9min. 10sec.
Longitude, N. 30deg., 9min. 55sec.
Diameter of Receiver, 5 inches.
Height above ground, 1 foot.
Height above mean water level, 35 feet.

Month.	Depth.	Greatest fall in 24 hours.		Days on which ·01 inch or more fell.
		Depth.	Date.	
January.....	1·73	0·36	27th	17
February	3·07	0·87	27th	16
March	1·25	0·40	28th	8
April	4·10	0·75	9th	21
May	4·32	0·71	16th	24
June	3·68	1·65	16th	15
July	2·01	0·78	23rd	9
August	10·82	3·64	15th	24
September...	3·21	1·28	22nd	9
October	5·76	1·09	23rd	18
November	3·06	0·84	9th	13
December	2·70	0·75	28th	10
	45·71			184

The total Rainfall in 1878 was 1·12 inches above the average of the previous six years, as shown by the following table :—

Month.	1872.	1873.	1874.	1875.	1876.	1877.	1878.
	Inches	Inches	Inches	Inches	Inches	Inches	Inches
January .	7·79	4·76	4·63	5·87	1·91	5·77	1·73
February	4·24	1·17	2·91	2·08	5·33	2·79	3 07
March ..	3·16	3·60	2·03	1·66	3·92	2·66	1·25
April	1·83	0·39	1·67	2 65	2·70	2 90	4·10
May	2·11	2·72	0·67	2·93	0·23	2·47	4·32
June	3·71	1·93	1·71	5·34	1·91	1·48	3·68
July	4·67	4·03	1·78	6·27	1·24	4 94	2·01
August ..	3·12	3·66	4·57	3·82	6·06	5·70	10·82
September	3·67	2·75	5 45	4·05	7·08	3·25	3·21
October ..	4·45	4 42	4 83	7·80	3·84	4·89	5·76
November	5·56	2·29	2·71	7·78	5·27	6·54	3 06
December.	6·05	1·16	4·35	1·74	7·13	3·40	2·70
	50·36	32·88	37·31	51·99	46·62	46·79	45·71

The Meteorological Observations were :—

The month of January was particularly mild and relaxing with very few frosts. The Barometer was high, the culminating point was on the 12th, when it reached 30·638in., and the lowest on 25th, when it fell to 29·444in. The mean of the readings for the month was 30·121in. The temperature was much above the average, the minimum being 50·5 deg. on the 21st, and the maximum 28deg. on the 31st. The mean of maximum temperature was 46·8deg., of minimum 37·7deg. It was at or below 32deg. on 7 days; the prevailing winds were N.W. The Rainfall was 1·37in. and fell on 17 days. From observation of aqueous vapour, the mean of hygrometer dry bulb reading was 42·5deg., of wet bulb 40·9deg.

February was fine and tranquil up to 18th of month with occasional frost, subsequently it changed to damp and mild weather. The Barometer was highest on the 22nd when the reading was 30·554in. and lowest on the 14th when it was 29·756in., the mean of the barometer readings of the month was 30·213in. The maximum temperature was experienced on the 17th when it reached 58·9deg., the minimum on the 1st, viz. :—26·5deg. The mean of maximum temperature was 48·3deg., the mean of minimum 38·7deg. It was at or below 32deg. on 4 days. The Rainfall was 3·07in. and fell on 16 days. The

Hygrometer dry bulb, registered 40·8deg., the wet bulb 39·8deg. Westerly Winds prevailed.

March was a fine and dry month with frequent frosts at night. The Barometer was highest on the 17th, then showing 30·629 in., and lowest on the 23rd when it was 29·230in. The mean of the barometer readings of the month was 30·082in. The maximum temperature was on the 19th when it reached 57deg. The minimum was on the 23rd when it fell to 28·3deg. The mean of maximum temperature was 50·4 deg., the mean of minimum was 37·6deg. It was at, or below 32deg. on 13 days. The Hygrometer mean of dry bulb determinations was 43·8deg., of wet 41·1deg. The Rainfall was 1·25in. and fell on 8 days. The Winds were N.W. and moderate.

April was very changeable with wet and frost intermittent. The Barometer was low, highest on the 25th at 30·188in., and lowest on the 1st at 29·20in. The mean barometer height during the month was 29 68in. The maximum temperature was on the 30th when it reached 65·5deg , the minimum on the 1st when it fell to 29·2deg. The mean of maximum temperature was 57·6deg., of minimum temperature 41·5deg , the temperature was at, or below 32deg. on 3 days. Hygrometer dry bulb indicated 48·8deg. of aqueous vapour. The wet bulb 46deg. The Rainfall was 4·10in. and fell on 24 days. The Winds were chiefly N.E.

May was characterised by a good deal of moisture. The Barometer was highest on the 30th when it was 30·107in., and lowest on the 24th at 29·21in. Mean of the month 29·58in. The maximum temperature was on 31st when it reached 68·2deg. The minimum was 48·5deg. The average of the Hygrometer dry bulb reading was 55·8deg., of wet 52 5deg. The Rainfall was 4·32in., distributed over 24 days. Prevailing Winds, S.W.

June showed a marked improvement, affording hot and propitious harvest weather, there were however occasional thunder storms with heavy down-pour. The Barometer was highest on the 6th, then showing 30·20in., and lowest on the 11th, when it was 29·37in., mean of month 29·88in. The maximum temperature was 85·5deg. on the 27th., the minimum 46·2deg. on the 17th. The mean of maximum was 70·9deg., the mean of minimum 53·4deg. The Hygrometer dry bulb indicated 62deg., wet bulb 57·7deg. The Rainfall was 3·68in., this fell on 15 days. The prevailing Winds were chiefly S.E.

July was a fine, dry and hot month, with a high Barometer, which was highest on the 18th, at 30·309in., and lowest on 20th, then standing at 29·670in., mean for month 29·990in. The temperature was highest

on 21st, when it registered 54·6deg., and lowest on 28th, at 48deg. The mean of maximum temperature was 73deg., mean of minimum 65·5deg. The average of the Hygrometer dry bulb determinations was 64·3deg., of the wet 59·1deg. The Rainfall was 2·01in., the number of wet days were 9. The Wind was N.W. with occasional thunder storms.

August was a warm wet month, with remarkably heavy rain. The Barometer was highest on the 1st, at 30·28in., and lowest on 14th, at 29·36deg., mean for month 29·60deg. The Thermometer was highest on the 5th, when it registered 75·3deg., the lowest on the 17th; then being 49deg. Hygrometer dry bulb, recorded 62·7deg., wet bulb 59deg. The Rainfall of the month was the heaviest registered for some years. On the 15th the very unusual fall of 3·64in. occurred in 24 hours. The Wind was chiefly from N.W.

September was fine and dry to the 14th, when it changed to wet and stormy weather. The Barometer was highest on the 2nd, at 30·266in. and lowest on the 23rd, at 29·463in. The mean of the Barometer indications of the month was 29·995in. The Thermometer was highest on the 5th when it registered 74·3deg., and lowest on the 26th, then registering 40deg. The mean of maximum temperature was 65·2deg., of minimum 51deg. Hygrometer dry bulb showing 58·5deg. of aqueous vapour, wet bulb 55·7deg. The Rainfall was 3·21in., this fell on 9 days. Prevailing Winds were N.W.

October was wet with occasional frost. The Barometer was low, being highest on the 2nd, at 30·249in., and lowest on 26th when it fell to 28·975in. The mean for the month was 29·733in. The maximum temeperature registering 69deg., the minimum on the 30th, when it fell to 32deg. The mean of maximum temperature was 58·5deg., of minimum 41·6deg. It was at, or below 32deg. on 1 day. The Hygrometer dry bulb, shewed 51·4deg., the wet bulb 50·0deg. The Rainfall was 5·76in. extending over 18 days. The Wind chiefly S.W.

November was unusually cold, with frequent frosts. The Barometer low, it was highest on the 19th, at 30·391in., and lowest on 25th, at 29·326in. The mean of the readings of the month was 29·757in. The Temperature registered highest on the 10th, at 52deg., and lowest on 23rd, at 27·8deg. The mean of maximum temperature was 46·9deg., of minimum 34deg., at or below 32deg. on 6 days. The Hygrometer dry bulb was 39.0deg., of wet bulb 37·7deg. The Rainfall was 3·36in. extending over 13 days. The direction of the Wind was chiefiy N.

December was characterised by a continuation of cold weather. The Barometer was highest on the 24th, at 30·212in., and lowest on 19th,

at 29·220in. The average height of the mercurial colomn was 29 696in. The Temperature was highest on the 29th, at 52·6deg., and lowest on the 10th, at 19·5deg. The mean of the maximum temperature was 39 4deg. The mean of minimum 28·3deg. It was at, or below 32deg. on 24 days. The Hygrometer dry bulb was 33·0deg., of wet bulb 32·3deg. The Rainfall was 2·70in. The number of wet days 10. N.W. Winds prevailed.

The local conditions influencing the public health and which are immediately under the control of the Sanitary Authority are

THE DRAINAGE.

In my reports to your Board for the years, 1876, 1877, I detailed the system of sewerage of the whole of the Urban District. I described these as efficient and satisfactory as regards the central division of Cardiff and the western division of Canton; the east, or Roath division, is one that must soon require your consideration; the rapidity of the growth of population in this locality has rendered the present system of sewerage afforded, inadequate, especially at the eastern portion. It will therefore be necessary on this occasion to mention the additions to the sewerage in the several sub-divisions required by altered circumstances, these are in the

CENTRAL DIVISION:

An extension from Plas Turton to new entrance to Sophia Gardens, Cathedral Road, a sewer, the size being 3ft. 9in. by 2ft., with an inclination of 1 in 600ft.; a sewer from the new street North of the River Taff, from Trunk No. 4, to Cowbridge Road, White House Farm, size, 3ft. 3in. by 2ft., inclination 1 in 265ft.

THE WESTERN DIVISION:

A sewer from Wyndham and Romilly Crescent to Deaf and Dumb School, size, 2ft. 3in. by 2ft., inclination, 1 in 450ft.

A sewer in Conway Road, from Romilly Crescent to Old Llandaff Road, size, 3ft. 8in. by 2ft., gradient, 1 in 200ft.

EASTERN DISTRICT:

A sewer in Planet Street from Meteor Street to System Street, size, 3ft. 3in. by 2ft., gradient, 1 in 131ft.

A sewer in Pearl Street from Maud Street to Arthur Street, size, 3ft. 3in. by 2ft., inclination 1 in 600ft.

A sewer in Arthur Street from Pearl Street to Broadway, size, 3ft. 3in. by 2ft. gradient, 1 in 400ft.

A sewer in Cumrae Street, East Moors Cottages, size, 3ft. 3in., by 2ft., inclination 1 in 80ft.

A modification of the Adam Street Main Trunk sewerage has been rendered necessary by the rapid development of population in this and immediate neighbourhood.

During the past year my attention was called to the occurrence of zymotic cases of disease in Davies Street, Newtown. On inspecting the locality I found that on several occasions the basements of houses in this street were flooded during stormy weather, and the sewage escaped over the back areas, and in some instances into the houses; I referred the matter to your Surveyor, and it has eventuated in a plan being submitted and adopted by your Board, which will remedy the evil.

THE WATER SUPPLY.

In my previous reports I have endeavoured to set forth the salient points necessary to the consideration of this important branch of Sanitary Science, and I shall confine myself in this instance to the consideration of the waterworks supply, simply giving a few examples of the character of the well waters in order to show that the remarks I have previously made upon the general unfitness of the well waters of Cardiff are covered and fully borne out by experience. During the past year 15 samples of water from wells have been subjected to analysis, and two samples from vessels which had cases of fever on board, both of these samples were found by Mr. Thomas, the Borough Analyst to be in a very foul condition, and very possibly associated with the cases of sickness.

The analysis of the three samples of well water given in the table are typical of the class of water which is obtained from shallow wells in the Town of Cardiff. These samples were highly charged with mineral matters, among which sulphate of lime and magnesia salts formed a very appreciable proportion, and the oxidation products of sewage and animal contamination—nitrates and nitrites—were present in large and excessive quantity. I have in my last report described the nature of these compounds, and their production through the oxidation of organic matters containing nitrogen, and I therein stated the nature of the ills which might arise from the drinking of water so contaminated. It is interesting to note, that during the past twelve months much testimony has been added by various observers and experimenters, to strengthen the value of the suggestions I made, and the importance which I attached to the presence of nitrates in drinking water. Among others, I may mention a work on the sanitary examinations of water, etc., by Dr. Fox, Medical Officer of Health of East Central and South Essex. Dr. Fox has now pointed out the value of such determination in a very forcible manner, while in the

previous edition of his work he scarcely referred at all to the compounds under consideration. I am more convinced than ever that the water question in point of health consideration is an all important one, and I feel assured that your Board will recognise this and afford me as hitherto the power, and co-operation necessary, for the furtherance of matters connected with this branch of sanitary science. It will be noticed in glancing over the table that the samples of the well water given show an extreme degree of hardness, and the waste of soap in the use of these waters must be an item of considerable importance to the poorer classes, who of necessity employ them, while at the same time the objectionable chemical compounds which give rise to hardness exercise a prejudicial, and, to a certain extent, injurious effect upon the food which is cooked, leaving out of the question the action of such undesirable mineral substances upon the animal economy. At the present time when the public supply of water is under the consideration of your Board, with various schemes, having as their aim the extension of the storage, and the use of water from fresh sources to augment the supply rendered necessary by the increasing requirements of the district, I am led to think that this is a fitting time to express my opinion upon the quality of the water, and in dealing with this matter, I will endeavour to fully explain the points which I consider of importance. The water as now supplied by the Water Works Company is derived from the Llanishen Reservoir, and the Llandaff Reservoir. The source of this supply to the Llanishen Reservoir is, as I have before pointed out, the Lisvane Brook, and tributary streams, which are fed from rain falling on the gathering ground formed by the Lisvane hills, and the carboniferous limestone of this district determines the water shed, and in a great degree furnishes the spring supply. The nature of the land and the manurial application is not such as to afford much animal matter which shall enter into solution in the water, hence it follows that the water from Llanishen Reservoir is practically free from nitrogenous compounds of an active character. By reason of the large quantity of water which rises in springs from the mountain limestone, the water which enters into the Llanishen Reservoir is somewhat hard, and in consequence of portions of the gathering ground being of a boggy or peaty character, the water holds more or less peaty matter in solution. For a town supply therefore the hardness of the water and the organic matter, little, though it may be, are the chief defects of the Llanishen supply. The other source of supply is that known as the Ely filter beds. It is generally understood that the water from the Ely is filtered through beds of gravel into a subterranean channel, from which the water so filtered is pumped up into the Llandaff Reservoir, and that the character of the supply is dependent upon the condition of the water in the River Ely, and the efficiency of the filter beds, as agents of purification. In order that I might be in possession of facts which would enable me to know the chemical composition of the various

waters from which the water supply of Cardiff is collectively obtained. I mentioned to Mr. Thomas, the Borough Analyst, the desirability of our having such information, and at my request he kindly undertook to analyse samples of water from the various sources, and has placed the figures of his analyses at my disposal. The water from the River Ely and the sample from the Llandaff Reservoir were taken the same day, the weather previous to these collections being very wet. It will at once become apparent on comparing the analyses that there is very little similarity of composition between the two samples. The reason of this is not very obvious at first sight, but if we compare the analysis of the water as it is usually supplied from the Llandaff Reservoir with that of the spring in the Radyr Brook, the reason will at once become obvious The fact is, that the water which is pumped up at Ely is not derived from the River Ely in any considerable quantity, but it is the water furnished by the strata in which the subterranean channel is situated that is raised into the Llandaff Reservoir. It is not therefore the character of the Ely River water which requires to be primarily considered, but that of the water which percolates through the strata at the pumping station. The nature of the subsoil shows that it belongs to the magnesian limestone formation, and the chemical composition of the water indicates that this is the case. I think it well to point out that the highly cultivated soil in the neighbourhood, the increase of population, and the very probable spread of the City of Llandaff in the direction of the gathering grounds from which it is proposed to increase the supply—such as the Radyr Water Brook for instance, are considerations of vital importance. Where the magnesian limestone occurs the subsoil is intersected by fissures and slip cleavages, which render it very pervious to water, and where the subsoil is gravel, contaminated water may travel considerable distances. The drainage and sewage pollution to which the River Ely is subjected render it unsafe in a sanitary point of view to take a supply from, and as there is every probability of the population increasing, it is not desirable that water used for drinking purposes should be supplied from such a source. The chief points of difference between the water as supplied from the Llandaff Reservoir, and that from the Llanishen Reservoir, may be gathered from the two analyses of the Water Works Water, both of which samples were derived from the Llandaff Reservoir, and the analysis of the water from the Llanishen Reservoir, which is very constant in composition, and represented by that given in the table. It will also be seen that the total solid matter is only two-thirds as great in the Llanishen supply, which is also free from nitrates and nitrites. Now if it be admitted—which I fear it cannot safely be—that the points in favour of the use of the water from the Ely beds rendered it adapted for drinking purposes, there still remains a consideration of appreciable importance, this is the value of the two samples of water for domestic purposes. While in a general sense, a moderately soft water is best

adapted for all purposes, the use of hard water for cooking, washing clothes, and other ablutionary purposes is detrimental. In order to show how true this is in reference to washing purposes generally, I will endeavour to give approximately an outline of the waste of soap which a hard water entails, and as an illustration I will compare the two waters, the one from the Ely beds, and the other from the Llanishen Reservoir. The average total hardness of the Llanishen water is 18 parts per 100,000 parts, and the Ely water 27 parts per 100,000 parts. According to Dr. Frankland each degree of hardness indicates the destruction or waste of 12lbs. of the best hard soap by 100,000lbs. of water. In order therefore to get rid of 9lbs. of hardness (or its equivalent 9lbs. of carbonate of lime dissolved in the water) it would take 108lbs. of soap to 100,000lbs. of water or 1·08 of soap, to 1000 gallons of water. If we take as an average that six gallons per head of population are used for general washing and ablutionary purposes every day it would require 23·6lbs. of soap per head of population per annum to reduce the hardness of the Ely Beds water down to that of the Llanishen Reservoir water. With a population of 80,000 there would be an expenditure of £31,466 necessary in order to compensate for the loss of soap required to remove 9 parts of hardnes per 100,000 parts of water. These figures will appear astonishing, but they are nevertheless correct. It is right to add, however, that carbonate of soda is employed to get rid of the hardness of water in the operation of washing clothes, but this compound costs something, and its use is very undesirable; this is on account of its injurious effects upon cotton and linen goods, and also upon many dyes which are partly removed or destroyed by it. Many stains are rendered insoluble by hard water, and if the latter is coloured it is extremely difficult to prevent the colouring matter becoming mordanted as it were, and fixed in the fibre of the washed material. The evidence given before the Chemical Commission of 1857 fully dealt with the question of the hardness of water, both as regards its use for domestic and drinking purposes, and it was the unanimous opinion of the numerous scientific witnesses examined that its effects were alike injurious to health, and domestic economy.

RESULTS OF ANALYSES OF SAMPLES OF WATER, expressed in parts per 100,000.

By J. W. THOMAS, F.C.S.

Description.	Total Solid Impurity.	Albuminoid Ammonia	Free Ammonia.	Nitrogen as Nitrates and Nitrites.	Previous Sewage or Animal Contamination.	Chlorine.	Hardness.			Remarks.
							Temporary.	Permanent.	Total.	
No. 6	80·8	·009	·01	3·965	39,330	9·2	12·6	30·3	42·9	Nearly clear.
No. 7	108·4	·007	·0	5·959	59,270	11·2	16·1	55·5	71·6	Ditto.
No. 8	78·4	·006	·001	3·727	36,950	7·8	10·1	42·1	52·2	Ditto.
Water from River Ely ...	18·0	·006	·003	·0	0	1·2	...	...	12·5	Very turbid.
Water from Llandaff Reservoir	27·2	·006	·0054	·43	...	1·5	...	...	23·5	Nearly clear.
Water from Llanishen Reservoir	22·8	·008	·002	·0	0	1·15	...	...	18·2	Turbid.
Water from Spring in Radyr Brook	35·2	·005	·0	·237	2,050	1·15	18·7	10·1	28·8	Nearly clear.
Waterworks Water, Canton	33·2	·004	·0	·118	860	1·4	16·8	11·7	28·5	Ditto.
Waterworks Water, St. Johns	33·2	·006	·0	·0949	630	1·50	16·2	11·4	27·6	Ditto.

THE FOOD SUPPLY.

The quality of the food supply and its effect on public health is of equal importance to that of water supply. Recent observations have elicited again and again, that zymotic disease of a serious character has resulted from the ingesta derived from animals suffering from disease; and although the conclusions arrived at, may not in every instance be decisive, still sufficient evidence in all cases has been obtained to show that the subject is one requiring the serious consideration of those to whom the duty of watching over the public health is committed.

To promote this object, the Pathological Society of London, has delegated to a committee consisting of five of its members the duty of inquiring into, and to reporting on the subject. Dr. Vacher, the able and indefatigable officer of health for Birkenhead, at a special meeting of the N.W. Association of Officers of Health, was requested to prepare a paper, "on the Diseases of Animals, rendering them unfit for the food of Man." This was read to a general meeting of the association held in June, 1878, at Manchester. In this paper he suggested that the diseases of animals with reference to the meat market should be classified as under:—

1—Those diseases which undoubtedly render the meat unfit for the food of man.

2—Those diseases which depreciate the quality of the meat, or make it preternaturally liable to decompose, but which do not necessarily, except in their later stages, render the meat unfit for the food of man.

3—Those diseases which do not necessarily depreciate the quality of the meat or increase its liability to decomposition, and rarely render the meat unfit for the food of man.

This classification embraces a very wide field for observation, and if adopted by the large body of medical men whose especial duty it is to study all matters connected with the public health in a strictly scientific spirit, much good will result, and if in their several annual reports, their respective observations are conducted on an uniform basis, a digest of the whole will clear away many important doubts and greatly promote the general public good, but to do this, it is essentially necessary that Medical Officers of Health should make themselves acquainted with comparative pathology, or that branch of medical science which treats of the diseases of animals. Conjoined with this, they should seek the co-operation of the members of the sister professions, veterinary medicine, and scientific chemistry. It has been my good fortune, as it has been my privilege, to have obtained the

assistance of the two members of these professions, both of whom hold appointments under your board, Mr. C. Moir, M.R.C.S., your cattle inspector under the Contagious Diseases of Animals Act, and Mr. J. W. Thomas, F.C S., your highly scientific Borough Analyst, and I can but refer to the valuable assistance I have received from both these gentlemen on every occasion that I have sought this, but never more so than during the prevalence in 1875, of the severe epizootic epidemic, "The Foot and Mouth Disease." Concurrent with this epidemic, my attention was directed to a severe form of sore throat prevalent amongst children, especially in the neighbourhood of Whitchurch and Llanishen, where the Foot and Mouth Disease existed in nearly every dairy. Although very severe, and in one or two instances coming under my observation, fatal, it differed in some of its essential characteristics from diphtheria, its mortality was not nearly so great in proportion to the number attacked with the disease, there was none of the albuminoid secretion accompanying diphtheria, but the disease presented a vesicular character, attacking the uvula, tonsils and pharynx. In two or three cases vesicular bullœ were observed about the finger nails; a very careful microscopical and analytical examination was made in every case when the samples of milk could be obtained, and we rarely failed to find evidences of a diseased condition of this secretion. In all cases were this was discovered, the use of the milk was prohibited, and its prohibition marked the subsidence of the disease amongst the children in that locality. In the acute stages of foot and mouth disease when the udder is affected the secretion becomes less in quantity and peculiarly rich in solid matter, and the constituent compounds are generally present in abnormal proportion. When chemical evidence could not throw much light upon the character of the milk, the microscope invariably disclosed some peculiarity foreign to healthy milk, and in most instances the appearances thus afforded were so uniform and conclusive as to leave no room for doubt that the milk was drawn from a diseased cow. As an illustration of the difference observed in the chemical composition of the milk of cows suffering from foot and mouth disease, the following analyses (1 and 2) of diseased milk are given, and the composition of healthy milk (3) inserted for comparison:—

No.	Water.	Fat.	Casein.	Lactin.	Ash.	Total Solids
1	76·40	9·91	8·01	4·69	0·99	23·60
2	81·80	7·01	5·92	4·77	0·80	18·20
3	85·94	4·00	5·01	4·31	0·74	14·06

The following are characteristic microscopical appearances:—during the earlier stages of foot and mouth disease, before the mammary glands appear to sympathise or become observedly affected, neither the chemical or microscopical evidences are strongly marked. There is, however, one peculiar character noticeable, viz., the affinity of the fat globules to aggregate in masses leaving a portion of the microscopical field uncovered. In healthy milk the fat globules are equally distributed throughout the field of the microscope, and they are generally symmetrical in form and the caseous envelopes present no peculiarities. The microscopical appearance of the milk from a cow sufforing from Eczema Epizootica in the first stage shows this aggregation of the fat globules, and also reveals an abnormal condition of the caseous envelope, which is seldom spherical and which from its fluorescent appearance seems to indicate that the casein exists in a somewhat modified form. As the disease advances, and the mammary glands are affected, the microscope shows that the milk contains numerous foreign ingredients and altered constituents. The colour heightens—colouring matter resembling diluted hœmatin is present and not unfrequently blood can be detected by the guaiacum—peroxide of hydrogen test. Pus cells—characteristic epithelium scales, animal membrane, and numerous animal matters like dried blood, &c., possibly from sores on the teats are present. At this stage the caseons envelopes of the fat globules appear very thin and glairy, mucous-like, and intensely refractive. The caseous envelopes are irregular in form and deficient in tenacity, so that a portion of the butter fat is liberated and several particles aggregate and yield a streak of refractive matter, which may frequently be mistaken for foreign bodies under the microscope. In the acute stage of the disease the milk is usually acid when fresh drawn, and although the casein is not readily coagulated the globules of butter fat collect in small masses, and when a drop is let fall on a slip of glass stellate crystals of fat are seen. If a sample of milk so affected is shaken for a few minutes a considerable lump of butter fat may be caused to separate and collect. The stellate crystals of fat are of less size as the disease terminates, and the disposition of the fat globules to aggregate ceases when the disease is entirely removed from the system. Bacteria make their appearance in this milk in a very short time, but it is somewhat uncertain if they are ever present in the milk when it is in the udder unless the latter is very seriously affected.

On several occasions during the prevalence of infantile diarrhœa, I have had samples of milk examined by Mr. Thomas, who has detected pus cells, and hœmatine in the milk used by these children, and on enquiry Mr. Moir has found gargit, or mammitis, that is suppurative inflammation of the teats or udders of the cows in the dairy from whence the milk was obtained, I have then enjoined the use of condensed or Swiss milk with great advantage. It is, therefore,

highly desirable that in all cases where children are suffering from infantile diarrhœa, the medical gentleman in attendance should ascertain the quality of the milk supplied to the sick child. Upon a recent occasion the attention of the Pathological Society was called to some cases of diphtheria assumed to be due to the consumption of diseased milk, and it was upon this occasion that the committee, to which I have alluded, was delegated to enquire into the subject. I can but feel, if the committee embraced some of the members of the veterinary profession, and enlarged its area of enquiry, extending it not simply to the probable causation of zymotic disease, but also to that of constitutional diseases, great results would be obtained. It is well-known that dairy cows suffer extensively from Tuberculosis or Phthisical disease, and a strong opinion has been expressed that the the milk obtained from cows suffering from this disease can communicate it to the human species.

Veterinary hygieinists confidently affirm that cows kept in badly constructed, filthy, and ill ventilated sheds, readily succumb to this disease, that its presence is detected by the gradual wasting of the animal with the usual concomitant symptoms, that during this time lactation is constantly kept up, and the milk used for human consumption.

The Contagious Diseases (Animal) Act provides that all cow-sheds should be registered, and that dairy cows should be under constant supervision. I can but anticipate that this will effectually repress the dangers to which I have just alluded.

Dr. Parkes in his very valuable work on hygieine details the following as the diseases of cattle requiring to be watched by the Medical Officer of Health:—Pleuro-pneumonia or lung disease, foot and mouth disease (aphtha, or eczema epizootica) cattle plague, (typhus contagious, steppe disease, rinderpest) anthrax or carbuncular fever, simple inflammatory affections of lungs, bronchitis, and simple pneumonia, dropsical affections of kidneys or heart disease, and phthisis.

The diseases of sheep:—braxy or splenic apoplexy, smallpox, black quarter, (the erysipelas carbunculosum,) acute lung disease, red water, phthisis, which is produced by the ova of the strongylus filaria; the rot in sheep (fluke disease) caused by the presence of the entozoon, distoma hepaticum in large numbers in the liver, the gid, sturdy, or tunsick which is caused by the development of the cœnurus cerebralis in the brain.

The pig is attacked by anthrax in different forms:—by typhoid fever, (now very prevalent throughout this district,) a disease considered by Dr. Budd to be the prototype of enteric or typhoid fever in man.

The so-called measles due to the presence in the muscle or lean of pigs of the ova of the cysticercus cellulosus, the supposed cause of tape-worm in the human race, when the flesh of pigs suffering from this disease, is eaten under done; and lastly the Trichina Spiralis.

It is also desirable to ascertain, whether, and to what extent the process of cooking can destroy the danger of producing disease if used for human consumption.

During the past year my attention on several occasions has been directed to the examination of meat supposed to be unfit for human food. In the discharge of this duty, whenever I have found the general appearance of the carcase, the colour of the meat, and also that of the fat, have been such as to convince me that the animal has suffered from disease of a febrile character, sufficient to induce great constitutional disturbance, I have caused action to be taken, and 1,101lbs. of diseased meat have been destroyed by order of the magistrates.

THE POPULATION.

The Cardiff Urban Sanitary District was formed subsequent to the census of 1871. This district is of an exceptional character, by reason of the rapid development of the two newly acquired sub-divisions—Roath and Canton—it is therefore nccessary to employ other than the ordinary data for the purpose of forming an estimate of its population. I have selected that considered applicable to a district such as Cardiff is, by ascertaining as far as practicable, at the end of the year, the total number of inhabited houses (excluding those not occupied) and allowing for each house the same number of occupants as was returned by the censuses of 1861 and 1871. The number of houses was found to be 11,961 and this multiplied by 6·25 gave a population of 74,756 inhabitants proper. The explanation of the unusually large proportionate number of inmates per house has been explained in previous reports. By a similar process, the approximate average number of seamen constantly in the port was arrived at. The total tonnage entering the port in 1871 was 2,295,736 tons—when the census was taken on the night of the 31st of March, of that year, 4,192 seamen were returned as being on the Docks, this may be taken as a fair average. In 1878 the total tonnage had increased to 3,435,254 tons. Taking the former as a basis for calculation, it may be assumed that the average number of seamen in the Docks during 1878 would be 6,470. The population estimate therefore will be :—

The population proper of the Urban District	..	74,758
The average number of seamen in Port	..	6,470
Total		81,228

But for statistical purposes I take the mean of the increase between 1877 and 1878, this gives 79,073.

The area of the district is 7,374 acres exclusive of that portion covered with water, but practically the population is resident within an area of 1,312 acres:—

THE MARRIAGES.

The return of marriages for 1878 was 721, this shows a considerable diminution as compared with former years; a circumstance probably due to the depressed state of trade, and commercial interests of the port, as of the Kingdom generally. This view is in accordance with that suggested by the Registrar General in his Quarterly Report, for March, 1878. In that report he states that "the marriage rate of the Kingdom, has been declining since 1876; and that it bids fair to show that the marriage rate for 1878 will be less than in any year since 1866, when great commercial depression caused for some time a considerable falling off in marriages." He then goes on to say "that the decline in the marriage rate in recent years has been much more marked in the mining districts of Durham, Northumberland, South Wales, and Monmouthshire, than in those parts of Lancashire and Yorkshire where the population is mainly engaged in textile manufacture."

THE BIRTHS.

The births registered in Cardiff during the year were:—

QUARTER ENDING	CARDIFF.		ROATH.		CANTON.		TOTAL.
	Males.	Females.	Males.	Females.	Males.	Females	
March ..	217	204	120	93	73	53	760
June ..	189	168	118	105	68	59	707
September ..	174	176	95	121	66	51	683
December ..	176	164	91	93	62	59	645
Total ..	756	712	424	412	269	222	2795

Showing a total of 2,795, being an increase over the previous year.

The Birth rate was 35·3 per 1,000 inhabitants. This calculation is based on the mean estimated population of the district, which includes the 6,740 seamen whose families reside elsewhere. Had the calculation been based on the population proper, the average would have been 36 per 1,000. The average birth rate of the Kingdom for the year was 35·9 per 1,000.

THE DEATHS.

The deaths registered in 1878 were 1,468 as against 1,476 the number registered in 1877, and were as follows :—

	Quarters ending	Males.	Females.	Total.
Sub-division Cardiff	March	133	111	244
	June	125	99	224
	September	124	97	221
	December	128	93	221
Sub-division Roath	March	47	55	102
	June	38	39	77
	September	43	48	91
	December	37	47	84
Sub-division Canton	March	27	31	58
	June	33	16	49
	September	20	22	42
	December	25	30	55
	Total	780	688	1468

The death-rate was 18·5 per 1,000 population, this is the lowest rate recorded in any year since the formation of the district.

The following table shews the death-rate of Cardiff as compared with the death-rate of the 139 districts, and sub-districts, comprising chief towns :—the death-rate of the remaining districts, and sub-districts comprising chiefly small towns and country parishes :—as also the average death-rate of the Kingdom.

	Quarters ending—				
	March.	June.	Sept.	Dec.	
Cardiff	20 4	17·7	17·9	18·2	18·5
39 districts and sub-districts comprising chief towns ..	24·5	22·2	23·1	24·8	23·7
The remaining districts and sub-districts, comprising chiefly small towns and country parishes	20·5	18·9	17·2	19·4	19·
Average death-rate of the whole Kingdom	22·8	20 8	20 6	23·6	21·7

This comparative table indicates that the death-rate for the year of the Cardiff Urban Sanitary districts contrasts very favourably—not only with the death-rates, of the large towns, and the Kingdom

generally—but also, with that of the small towns and country parishes.

The following return shews the total marriages, the births, and birth-rates, and the deaths and death-rates for 1878 and the previous years. It is, however, to be noted that after 1874, the Urban District of Cardiff absorbed the two sub-urban districts of Roath and Canton, hence the sudden large increase of the population, the births and deaths in 1875, while the number of marriages but little—the latter apparent anomaly being due to the circumstance that the marriages of the suburban districts were included in the Cardiff district during the whole of the period:—

Years.	Estimated population.	Marriages.	Births.	Birth-rate per 1,000 population.	Deaths.	Death-rate per 1,000 population
1868	37,562	586	1387	35·8	843	22·5
1869	38,220	585	1414	39·9	1005	26 2
1870	38,878	578	1406	36·1	903	23·2
1871	39,536	558	1391	35·6	891	22·5
1872	40,431	658	1358	33·5	916	22·6
1873	41,326	741	1430	34·1	995	21·3
1874	42,221	812	1550	36·7	885	23·5
1875	72,760	841	2716	37·3	1547	21·2
1876	74,741	746	2707	36·2	1455	19·1
1877	76,918	811	2772	36·	1475	19·1
1878	79,073	721	2795	35·3	1468	18·5

The following table of the comparative births and deaths for 1878, and previous 30 years, is intended to illustrate the effect of sanitary work on the mortality of the district. It is also to be borne in mind that when the Sanitary Inspector of the Board of Health in 1848 made his report to the general board on the sanitary condition of Cardiff, and the expediency of placing it under the provisions of the Health of Town's Act—he stated "that the total deaths of the 10 years antecedent to his enquiry exceeded the total births, and the average death-rate of Cardiff during that period was over 30 per 1,000 of population":—

Years.	Births.	Deaths.	Excess of Deaths over Births.	Excess of Births over Deaths.	Death-rate per 1000 Population.	
1848	428	579	151		35·3	
1849	466	864	398		54·0	
1850	504	485		19	28·6	.. { Sanitary Inspctn. Lodging-houses.
1851	575	525		50	28·6	
1852	696	620		76	28·6	
1853	865	644		221	26·8	
1854	950	925		25	34·9	
1855	1079	641		438	21·7	.. 1855, first portion of present system drainage used.
1856	1227	772		455	22·1	
1857	1367	883		484	23·2	.. 1857, first main of present water supply used.
1858	1356	753		603	20·3	
1859	1336	826		510	22·3	
1860	1246	662		584	18·9	
1861	1223	837		386	23·9	
1862	1268	695		573	19·4	
1863	1302	862		440	23·9	
1864	1399	932		467	25·5	
1865	1382	867		515	23·4	
1866	1331	882		449	23·5	
1867	1397	873		524	23·5	
1868	1387	843		544	22·5	
1869	1414	1005		409	26·2	
1870	1406	903		503	23·2	
1871	1391	891		500	22 5	
1872	1358	916		442	22·6	
1873	1430	995		435	21·3	
1874	1550	885		665	23·5	
1875	2716	1547		1169	21·2	
1876	2707	1455		1252	19·1	
1877	2772	1475		1297	19·1	
1878	2795	1468		1327	18·5	

* In 1849 the town was visited with a severe epidemic of cholera, and again in 1854.

The mortality of age throughout the years stands thus:—

Under the age of one year	419
One year and under two years	124
Two years „ five years	90
Five years „ fifteen years	67
Fifteen years „ twenty-five	100
Twenty-five „ thirty-five	121
Thirty-five „ forty-five	133
Forty-five „ fifty-five	122
Fifty-five „ sixty-five	132
Sixty-five „ seventy-five	82
Seventy-five „ eighty-five	62
Eighty-five „ ninety-five	13
Ninety-five upwards	3
	1468

This analysis indicates that the infantile mortality of these districts contrasts very favourably with that of the average of the kingdom, and especially so, with that of the other large Towns. The death-rate of children under the age of one year to every 1,000 births in Cardiff, with that of the average of the kingdom, and the large Towns is as under :—

	Death-rate of children under the age of one year to every 1,000 births.
The Urban Sanitary District of Cardiff	.. 149
The general average of the Kingdom	.. 152
The average of the large Towns	.. 173

The registered causes of entire deaths, during 1878 are classified below together with the death-rate of the district, as also that of the Kingdom :—

CLASSES,	Total Deaths.	Death-rate per 1000 Inhabitants, 1878.	Average Death-rate per 1000 Inhabitants of Kingdom, for a period of 25 years.
1 Zymotic Diseases ..	254	3·212	5·038
2 Constitutional do.	289	3·654	4·205
3 Local do.	628	7·942	8·499
4 Developmental do.	190	2·402	3·551
5 Violent do.	74	·935	0·761
6 Not classed	33	·417	
Total	1468	18·5	22·282

In class No. 6, deaths of which have given rise to inquests are included when the verdict has been from natural causes, as well as those when the registered cause is ill-defined.

The first-class is the most important inasmuch as these diseases are considered to be much aggravated by, if not altogether due to, preventable causes, and that when they are in excess it indicates defective sanitary arrangements. Moreover it will be found that when the general death-rate is high, zymotic diseases have contributed largely to it. The sanitary history of Cardiff in a marked degree confirms the truth of this theory.

The Registrar General selects seven which he distinguishes as the chief zymotic diseases, more especially amenable to sanitary provisions. These are :—small-pox, measles, scarlatina, diphtheria, whooping cough, fever, and diarrhœa.

Tabular forms A and B in appendix are constructed in accordance with the directions of Registrar General, these show the relative

extent of deaths amongst all classes due to these diseases, as also the amount of sickness and mortality amongst paupers, and inmates of public institutions.

The annexed form shows the total deaths from these diseases, as also the several death-rates, during the ten years ending 1877 and also for 1878.

CARDIFF URBAN SANITARY DISTRICT.

TABLE showing the number of Deaths from the seven principal Zymotic Diseases, in the 10 Years, 1868 to 1877, and in the Year, 1878.

Years .... Population DISEASES.	1868 37,562	1869 38,220	1870 38,878	1871 39,536	1872 40,431	1873 41,326	1874 42,221	1875 72,760	1876 74,741	1877 76,981	Annual of 7 yrs. 1874	Average of 3 yrs. 1877	Proportion of Deaths to 1000 Deaths in 10 years. 1868—1877	1878 79,073	Proportion of Deaths to 1000 Deaths in 1878
Smallpox	4	4	0	13	55	8	2	1	1	3	12·2	1·6	9	1	·6
Measles	11	17	5	4	69	2	52	4	8	126	22·8	46·	29·7	3	2·
Scarlet Fever ..	21	50	26	90	15	4	13	132	201	30	31·2	12··	58·1	10	6·8
Diphtheria	2	11	2	1	2	6	6	11	10	1	4·2	7·3	5·1	12	8 1
Whooping Cough	10	33	29	1	20	19	12	38	25	40	17·7	34·3	22·6	70	47·5
Fever	29	26	40	28	38	27	33	38	25	36	31·4	33·	31·7	28	12·2
Diarrhœa	30	15	31	21	35	37	36	70	69	19	29·2	52·6	36·2	74	50·4
Total	107	155	133	158	234	103	154	294	339	255	149.1	296·	197·9	198	134·

In 1875 the Cardiff District was enlarged, by absorbing the two districts of Roath and Canton.

This table shows that in 1878 there was a diminution in zymotic diseases as compared with previous years. Thus during the seven years ending 1874, the average estimated population being 39,790, the mean deaths from the seven chief zymotic diseases were 149. In 1875, the Cardiff Urban Sanitary District was formed by the absorption of Roath and Canton, the mean estimated population for the succeeding three years was 74,886, the yearly average deaths from these diseases were 296. The percentage of deaths from zymotic diseases to total deaths 19·8. In 1878 the mean estimated population for the year was 79,073, the deaths from the seven chief zymotic diseases were 198, the percentage of deaths, to total deaths were 13·4. This illustration indicates that the decreasing mortality from zymotic diseases is an important fact in the diminished death-rate of the district, and I may still further confirm this view, by contrasting the death-rate from these diseases in 1878, with the death rate ruling the 20 typical large towns during the same period as given by the Registrar General, thus the death-rate from zymotic diseases in Cardiff to every 1000 population was 2·5, that of the large towns 4·4.

The following is a detailed statement of the sickness and mortality which have fallen under my observation during the past year. I must here acknowledge the great courtesey and attention I have received from my professional brethren, by the early information respecting cases of infectious disease when such information has been calculated to assist me as your Sanitary Officer.

I shall first direct your attention to the epidimic disease, smallpox. Few cases of this disease have occured in Cardiff during 1878, and most of these were imported. In the month of January, the s.s. "Sybilla" arrived in this Port with a case of confluent smallpox on board, on visiting this vessel I ascertained that a day or two after leaving London, the man was taken ill with the premonitory symptons of the disease. I caused him to be removed immediately to the seamen's hospital. I carefully examined the whole of the crew, they were all healthy and I inspected the log book. Sanitary provisions were adopted to prevent any extension of the disease; the vessel was thoroughly disinfected, especially the cabin, in which the sick man was lying. His bedding and clothes were taken in charge by your Sanitary Inspector, Mr. James, and removed to the disinfecting chambers recently erected by your Board. I may here state that a temperature exceeding 240° Fahrenheit can be readily obtained in these chambers. The vessel and crew were kept constantly under observation during the whole of the time the ship was in dock, isolation and communication with those on shore limited to that absolutely necessary for transacting the business of the ship, and no extension of disease followed.

In April, my attention was called by the Medical man in attendance to a case of smallpox in a private house in Park Street, Cardiff. On

enquiry, I ascertained that the patient was a Captain belonging to the merchant service, and had arrived the day before from a Foreign Port, the case was in a semiconfluent form and progressing towards convalesence. Strict isolation was maintained, the case was reported to the Vaccination Officer, and enquiry made as to the effectiveness of vaccination in the neighbourhood, it was found to be satisfactory. On recovery the clothes and bedding of the patient, as also the house, were thoroughly disinfected, and no other case occurred.

In August, I received a telegram from Hull, stating that the s.s. "Zealous," had left that port for Cardiff, and that while in Hull two cases of smallpox had been removed from the vessel to the hospital. On its arrival here I visited the ship, but the whole of the crew were healthy, as a matter of precaution the ship was re-disinfected, and kept under observation while in this port.

In September, the s.s. "Persia," arrived in this port from London, with a case of confluent smallpox on board. I directed the sick man to be removed to the Seamen's Hospital, where he ultimately died; he had not been vaccinated. The remainder of the crew were examined and found to be in good health, the vessel was kept under observation, and the sanitary provisions as in other cases adopted, no fresh cases were reported.

My attention was called by a medical gentleman to a case of semi-confluent smallpox in Eleanor-street, isolation was strictly enforced, and the sanitary regulations observed, as in the case in Park-street. One more case in the same street was also reported to me, I found this to be in a very modified form.

In December a case in Adelaide-place, Bute Docks, and four in Harrowby-street, were reported to me, on visiting them I found they were all very mild cases of a modified form, and rapidly passing on to convalescence. Up to this date, March, no other case has occurred.

On every occasion I immediately drew the attention of Mr. Watkins, the Vaccination Officer, to the circumstances of the case, who visited the localities, and made enquiries as to the state of vaccination. I also, inspected the arms of all the children belonging to the working-classes in such district where epidemic disease might be expected to occur, and I can report that vaccination appeared to me to be well carried out among this class. I would here wish to observe that the vaccination as conducted by your Public Vaccinator, Mr. Horder, is most effectively performed, and it is due to him to state, that whenever I have appealed to him for aid in all sanitary provisions associated with his duties, he has most readily afforded it. He also visited and inspected all the public schools, examining the arms of upwards of 2,000 children.

Measles—3 deaths occurred from this disease, two were in Cardiff and one in Canton.

Scarlatina—Only ten deaths were registered from this disease. This number is considerably below the average of the district during the last few years, and also much below that of the Kingdom The deaths were distributed over the district, thus:—two in Cardiff, 5 in Roath, and three in Canton. The deaths in Cardiff were:—one, a female, in July, residing in Margaret-street, Bute Docks, and one a female in Dudley-street, in same district. The five deaths in Roath were, one in March, a male in Bertram-street, two females residing in the same house in Clifton-street, and two in December, one being a male in Constellation-street, and one in John-street. The three deaths in Canton were, one in March, a male residing in Severn-road, one in May, in Halket-street, and one in June, in Lewis-street. Of all infectious diseases, scarlatina presents the greatest difficulty in the effective application of preventative measures, to some degree due to the nature of the materies morbi, namely, its ready elimination from the skin, the mucous membrane, and the excreta, thus poisoning the atmosphere in houses where isolation is practically almost impossible, as among the working-classes living in dwellings occupied by more than one family, and the well nigh hopelessness of obtaining that amount of co-operation necessary to prevent the danger of spreading the disease, on the part of friends in the visitation of infected houses. In every case, the latter precaution has always been strongly urged; but is too frequently disregarded. Children from infected houses are forbidden to attend school, until such houses are declared free from infection, and intimation is given to the master or mistress of the schools that it is dangerous to receive children from these houses.

Diphtheria—caused 12 deaths, of these eight were in Cardiff, one in Roath, and three in Canton. It is a remarkable fact that no death occurred among the families of the working-classes residing in the Irish lodging-houses, although these houses exceed 1,100 in number and afford accommodation to 10,000 inmates. The deaths were confined to the families of the gentry, the well-to-do tradesmen, and the better class of mechanics. Whenever the cases were reported to me, I visited the houses, and endeavoured to ascertain if any probable excitant, or predisposing cause existed. In almost every instance I had little difficulty in detecting sewer exhalations from defective construction of W.C. arrangements. I called the attention of Mr. Williams, your surveyor to the circumstance, and he made a personal inspection, reporting the result to you. His remarks were so pertinent, and the suggestions he made so valuable, that I here insert them in extenso, they were to this effect:—

"The Medical Officer of Health has called my attention to some fatal cases of diphtheria having occurred within the Borough; and which he attributed to the escape of sewer gas.

I visited the houses in question (which have been built some years), and made a careful examination of the sanitary arrangements. In some cases the pressure of sewer gas was very marked in the water-closets, and when the closet handle was lifted, a large escape of foul air took place.

I attribute this to two causes, first, that no inverted "syphon" or "sewer air trap" exists in the house drains, between the main sewer in the street, and the "trap" of the water-closet in the houses, and that the house drains may therefore be viewed as so many conduits leading from the sewer direct to the water-closets within the dwellings, charged with sewer gases, which rush out each time the water-closet is used.

Second, that no provision is made for ventilating the soil pipe, by a pipe attached to it at the back of the "water-trap" of the water-closet, and open to the atmosphere

In the sanitary arrangements of dwellings, it is impossible to over estimate the importance of intercepting sewer gases before they enter those parts of the drains, adjacent to, or under the houses.

To secure this, "sewer air traps" of the double type should be placed in the house drains near the sewer, by means of which two "seals" or "traps" are formed, with facilities for ventilating the "traps" between them (when conveniently placed).

The whole length of drain, between this point and the water-closets within the house, would thus be free from sewer gas, and the heavy deposit of decomposing organic matter commonly formed, adhering to the drain pipes and down pipes from the W.C.'s, would be very largely avoided.

Should any small quantities of sewer gas at any time pass the "sewer trap" or syphon, the ventilating pipe at the back of the water-closet "trap" would enable it to escape freely into the atmosphere.

Notices have been served on the owners of those houses, in which it was found no provision had been made as above mentioned, requiring them to carry out the alterations necessary for the abatement of the nuisance."

Whooping Cough—The infantile epidemic whooping cough, which prevailed during the previous two years increased somewhat in intensity

in the early spring of 1878, under the influence of atmospheric changes, 70 deaths were registered from this disease, distributed thus:—Cardiff, 35; Roath, 32; Canton, 3.

Fever—The mortality from fever was 38. It is satisfactory to find that the death-rate from this disease has considerably decreased for some years. The proportion of death-rate to every 1,000 inhabitants was 0·352, that of the average of the Kingdom 0·866, it has been therefore less than half, that of the large towns and rural districts. Of the 28 deaths, three were under the age of five years, and seven between the ages of five and fifteen years, with only one exception, the cases were sporadic, as opposed to infectious. The exception being in a house in Theodore-street, Roath. These were pauper cases, and it is much to be regretted that the Union Medical Officer did not consider it part of his duty to call my attention to this house, as information was given to me only after the third case had occurred. On enquiry I found that the first case was an adult male, who previous to his illness had been somewhat irregular in his habits, this case was fata. The second case was the wife of the occupier of the house, who attended on the deceased, she ultimately recovered. The third was the young woman who waited on her, and for whom (just as I visited the house) arrangements had been made to remove her to the Union Workhouse, in which institution she died within three or four days. The house was afterwards effectively cleansed, limewashed, and disinfected.

Diarrhœa—There were 73 deaths from diarrhœa, of these 37 were in Cardiff, 22 in Roath, and 14 in Canton. The deaths were chiefly infantile, 67 being under the age of five years. The epidemic prevailed chiefly in July, August, and September. Although the evidence is not to be taken as conclusive, I can but feel that the quality of the milk must in the future be regarded with suspicion as a probable excitant cause of the disease. A strong presumptive evidence is afforded by the circumstance, that only four deaths from this disease occurred among the families of the Irish labourers, embracing a population in Cardiff, numbering probably 10,000, their children are not practically fed on cows milk.

A death was registered from cholera, in the Roath District, this was in the month of August. My attention was called to it by the Registrar I visited the house, and on enquiry I elicited that the deceased was the wife of a labouring gardener, and was engaged with him in his occupation. The day she was taken ill, she appeared to have eaten largely of raw vegetables, especially cucumbers. Her illness lasted upwards of a week, the excreta were different in character to those of cholera, and I had little difficulty in arriving at the conclusion, that the attack was due to the ingesta she had taken, and therefore, purely choleraic diarrhœa.

The remaining diseases of this order are less due to preventable causes, these are croup which contributed 20 deaths, erysipelas 5, ague, 1, rheumatism 4, and pyœmia 3. The next order, No. 2 comprises :— the enthetic diseases, of which, syphilis produced a mortality of 14, and stricture of urethra 1. Order 3 :—The dietic diseases, gave 1 death from scurvy, and 5 from alcoholism. Order 4 :—consisting of parasitic diseases, had 2 deaths from thrush.

Before leaving zymotic diseases, I may observe that a larger proportionate rate of mortality from this class took place in Roath, than either in Cardiff, or Canton, as is seen below :—

District.	Total Deaths.	Zymotic Deaths.	Proportionate per centage of Deaths Zymotic to total deaths.
Cardiff	910	145	15·9
Canton	204	28	13·5
Roath	354	78	22·0

This excess was also found to be greater among the residents on the southern side of the Newport Road, than on the northern side, and from the circumstances that my attention was called by the medical gentlemen in attendance on fever cases to the noxious effluvia arising from the ventilating appertures in the streets in this district, it is desirable that your surveyor should report on the existing state of the sewerage of Roath, especially in the locality to which I now allude.

The constitutional diseases in which class are tabes, phthisis, scrofula, hydrocephalus, as also gout, dropsy, cancer, and mortification, were less than the average of the Kingdom. Among these diseases, I may instance that phthisis has for the last few years sensibly declined. I attribute this to the improved system of drainage, of the lower portion of the town which is built on the alluvial clay, and the great extension in building on the northern side of the district, where the subsoil is more favoured, being light porous gravel. The death-rate from these diseases was 3·654 per 1,000 inhabitants, that of the Kingdom 4·205.

Local diseases were also less than the average. These diseases however, comprise a class little or not at all influenced by preventable causes. They are chiefly inflammatory affections of the viscera which are easily produced by atmospheric disturbances, namely, diseases of the respiratory organs (bronchitis, pneumonia and pleurisy). The death-rate from local diseases was 7·942, that of the Kingdom 8·499 per 1000 inhabitants.

Developmental diseases—This class comprises the diseases of childhood, (infantile epidemics excluded). It is satisfactory to find that the mortality from these diseases is much below the average. Although the district has suffered more or less from the depressed condition of trade and want of full employment, the diseases, atrophy and debility have occasioned a light mortality, indicating that our infantile population has not suffered from privation or want of care.

Violent deaths, and deaths especially requiring the investigation of the coroner are in excess, this is due to the circumstance that the commercial interests of the Port are largely associated with occupations exposing those employed to the chances of accidents, namely, the shipping, the manufactories in the immediate neighbourhood, and the three important railways. Thus out of a total of 74 deaths from violence, fractures, contusions, and drowning contributed 59. In the total of these given as not classed or ill-defined is included deaths were a coroners investigation has been held, and where a verdict was returned of death from natural causes simply, in contradistinction to others where the same verdict is given, but with the probable seat of cause of death, as heart disease, convulsions, or apoplexy, in such cases, added, the cause of death is included with the classified deaths from such causes.

The deaths in public institutions were :—

Infirmary	30
Seamen's Hospital	19
Union Workhouse	110
Gaol	1
Total ...	160

The Sanitary duties discharged by your Officer of Health and Sanitary Inspectors during the year :—

Day visits made by Inspectors' of Lodging-houses to Officer of Health	11,861
Night ditto ditto ditto ditto ...	2,578
Houses reported overcrowded, and action taken	277
Number of convictions for disobeying order to reduce inmates Penalties varying from 10s. to 40s. and costs	37
Number cautioned by Magistrates	8
Houses ordered to be cleansed and limewashed	202
Houses disinfected after infectious disease	93
Houses reported as unfit for habitation owing to dilapidation	11
House drains and surface sewers found defective and action taken	537
Wells closed 6; and number of houses supplied with well water	23
Premises found to be in a state dangerous to health ...	14
Animals kept on premises in improper state	57
Cow-sheds ordered to be cleansed and limewashed... ..	18
Brushes lent on loan for limewashing, &c., to occupiers ...	820
Meat seized and condemned, as unfit for food	1,101 lbs.
Number of penalties on butchers and others for same ...	6
Number of penalties inflicted on offenders for improperly emptying cesspools, (sums inflicted 10s. to 40s. and costs)	2

PORT SANITARY WORK.

I have now to direct your attention to the duties devolving on your Port Sanitary Medical Officer. To enable you to form an estimate of the sanitary provisions necessary to be adopted to prevent the introduction of infectious disease. I annex a detailed statement of the total number of vessels annually entering the Port, extending over a period of eight years, distinguishing those arriving foreign, from those arriving coastwise :—

Year.	No. of Vessels Inwards.		Total No. of Vessels Foreign and Coastwise	Tonnage.		Total Tonnage Foreign and Coastwise Inwards.
	Foreign.	Coastwise.		Foreign.	Coastwise.	
1871	4,234	6,919	11,133	1,637,725	588,011	2,225,736
1872	4,942	6,994	11,836	1,957,897	600,805	2,552,702
1873	4.694	6,674	11,368	1,920,410	640,089	2,560,499
1874	4,966	6,213	11,176	2,113,987	545,692	2,659,679
1875	4,645	5,541	10,186	1,947,265	493,818	2,441,083
1876	5,511	6,957	12,468	2,367,307	601,240	2,963,547
1877	5,625	6,661	12,286	2,542,210	586,773	3,128,983
1878	5,867	7,138	13,005	2,821,409	613,845	3,335,254

In the year 1866 public attention was directed to the probable visitation of cholera, at this time there was no hospital accommodation for the reception of sick seamen, except that afforded by the General Infirmary, (an institution in itself hardly equal to the natural requirements of the district, apart from any provision it could make for sailors.) As the Medical Officer of the Local Board of Health, I directed the attention of those connected with the shipping interests in Cardiff, and Mr. John Boyle (trustee of the Marquess of Bute proprietor of the extensive Docks, bearing his name) to this pressing want, and it eventuated in a scheme for providing hospital accommodation with the least possible delay. Application was made to Government for an unused man-of-war ship to be fitted up for that purpose, the application was favourably received, and a subscription entered into to provide the means to bring the vessel into this Dock, and to make the necessary alteration. In less than six months the Hamadryad was in a condition to receive 65 in patients. It was then proposed that an attempt should be made to make the hospital self-supporting, and all vessels entering the port are asked to make a voluntary contribution of 2s. per 100 tons register for this contribution the vessel acquires the right to send any of its crew when ill into this institution, and to receive medical attendance, nursing, and board without further charge; so admirably has this scheme worked, and so freely is the application for this contribution responded to, that a

surplus, exceeding £400, receipts over expenditure, has been obtained for the last few years, and capitalised for the purpose of erecting a more permanent institution, when the present one has fulfilled its mission.

Attached to this hospital, and in convenient proximity to it, a building has been constructed to receive 40 cases of infectious diseases.

During the past year the following cases of sickness from on board the shipping in the Docks, were received into the hospital:—

Zymotic diseases		...	...	...	178
Constitutional disease		...	...	...	11
Local	„	...	...	...	141
Developmental	„	...	...	...	1
Violent	„	...	...	...	106
	Total	...	...	...	437

Among the zymotic disease, two were suffering from small-pox; nine from fever; three from erysipelas; seven from dysentery; and five diarrhœa, these were the most important as relates to sanitary regulations. The other diseases of this class treated in the Hospital, were:—acute rheumatism, 30; ague, 16; and the anthetic disease, syphilis, 40.

Beside the 505 indoor patients, 3,314 seamen were attended as out-patients.

Independently of the great boon, this institution has been to the shipping, it has afforded the means of readily dealing with all cases of infectious disease, and prevented the possibility of the introduction of such into the town, it moreover has afforded information of infected vessels in the rare instances, where such have escaped the observation of the Sanitary Authorities.

I have now to detail the arrangements adopted for the proper sanitary supervision of the shipping. Owing to the circumstance that the dock gates open direct into the channel, and that daily large number of vessels arrive in the Roads and enter the docks with every tide, there does not exist the ordinary facility for making the inspection of vessels afforded to other ports; but in view of this difficulty the Pilotage Board have given instructions to every Pilot immediately on commencing his duties, that he shall make himself acquainted with the facts that sickness does, or does not exist among the crew. If there is any case of sickness he has to call the attention of the Examining Officer of the Custom's to the fact. This Examining Officer has also to put the following questions to the Captain seriatim:—

1 From what port do you come ?
2 Have you had any communication with another vessel during this passage ?
3 Is every person on Board in good health ?
4 Has any one died on board during the voyage ?
5 Has any one been ill, and if so from what disease has he suffered ?

Should the replies to the three last questions be in the affirmative, he has to direct the attention of the Custom's Authorities to that fact, who without delay communicates the information to the Port Sanitary Medical Officer, and requires him immediately to visit the ship to make a proper investigation as to the nature of illness, and report the result to the Collector of Customs. Under ordinary circumstances these arrangements fully meet the requirements of the Port; but upon special occasions when there have been reasons to apprehend the danger of serious epidemic disease being introduced into the port. A steamer has been engaged with a Quarantine Officer on board to visit every vessel arriving foreign in the roads (whether such vessel is bound for Cardiff, or any other port in the Channel). This measure was adopted from September 1871 to January 1872, and from September 1873, to March 1874. On each occasion a possible visitation of cholera was believed imminent.

During the year :—

3 vessels were visited with small-pox on board.
9 vessels with fever.
3 vessels with erysipelas.
7 vessels with dysentery,
5 vessels with diarrhœa.

On each occasion the Log Book was examined, the whole of the crew personally inspected, and the sick immediately removed to the Hamadryad Hospital. The ship was required to be thoroughly disinfected, and especially the cabin occupied by the patient whose clothes and bedding were removed to the disinfecting chambers and exposed for three hours to the action of hot air. The ship and crew being placed under proper supervision until leaving the port. The three vessels with small-pox on board were isolated as far as possible from all other ships, and communications from the shore permitted, only to that absolutely necessary for conducting the business of the ship.

All other vessels reported with sickness on board were visited, but these required sanitary provisions to be adopted.

Seven chests and five bags of clothing belonging to seamen who had died from yellow fever, immediately after leaving foreign ports, were

received from the Custom's Officials, and thoroughly exposed to hot air, and afterwards returned-

The whole of the process of disinfection of ships as well as the clothing in the disinfecting chambers was conducted in the most effective manner by your Sanitary Inspector Mr. James. In conclusion it is but due to the zeal of this officer, as well as Mr. Gover, that I should again direct your attention to the very zealous, and trustworthy manner in which these officers discharge their several duties.

I have the honour to be, Gentlemen,

Your obedient Servant,

H. J. PAINE, M.D.,

Medical Officer of Health to Cardiff Urban Sanitary District, and Port Sanitary Authority,

Deaths registered at several groups of ages from Different Causes during the year 1878.

CAUSE OF DEATH.	AGES.													Total Deaths.
	0 to 1	1 to 2	2 to 5	5 to 15	15 to 25	25 to 35	35 to 45	45 to 55	55 to 65	65 to 75	75 to 85	85 to upwds	Ages under 1 yr.	
CLASSES.														
I. Zymotic Diseases ...	90	48	40	20	12	8	10	8	8	3	1			254
II. Constitutional Diseases ...	22	16	32	19	28	54	51	36	10	12	1			68
III. Local Diseases ...	172	35	26	20	31	36	53	66	100	53	30	3		233
IV. Developmental Disease ...	115	11			2	6	3		4	11	26	9	3	190
V. Violent Deaths ...	7	3	3	3	8	16	13	14	7	3	2	3		74
Not specified or ill defined ...	12	1	1		1	1	4	2	5	4	1	2		34
Total ...	419	124	90	67	100	121	133	132	132	86	62	18	3	833
CLASS.														
I. ZYMOTIC DISEASES														
ORDER 1.—MIASMATIC														
1. Smallpox							1							1
2. Measles		2		1										3
3. Scarlet Fever (Scarlatina) ...		2	2	2	2									8
4. Diphtheria		1	1	3	5	1		1						12
5. Quinsy														
6. Croup		2	6	9	1									18
7. Whooping Cough ...		30	22	16	2									68
Typhus Fever ...					3	1	1	1						6
8. { Enteric or Typhoid F. ...				2	3	5	4		3	1				18
{ Simple continued F. ...				1	1	2								4
9. Erysipelas		2							1	2				5
10. Puerperal Fever (Metria) ...														
11. Carbuncle														
12. Influenza														
13. Dysentry														
14. Diarrhœa		1												1
15. Diarrhœa		47	16	4					1	3	1	1		73
16. Cholera								1						1
17. Ague														
18. Remittent Fever ...														
19. Rheumatism						1	1		1	1				4
20. Other *Zymotic* Diseases							1	1						2
ORDER 2.—ENTHETIC.														
1. Syphilis		7		1			2	2	2					14
2. Stricture of Urethra ...														
3. Hydrophobia														
4. Glanders														
ORDER 3.—DIETIC.														
1. Privation														
2. Want of Breast Milk ...														
3. Purpura and Scurvy ...		1												1
4. Alcoholism { a. Del. Tremens											1			1
{ b. Intemperance								1						1
ORDER 4.—PARASITIC.								3	1					5
1. Thrush														
2. Worms, &c.		1	1											2
Totals		96	48	40	20	12	8	10	8	8	3	1		184
CLASS.														
II. CONSTITUTIONAL DISEASES														
ORDER 1.—DIATHETIC.														
1. Gout														
2. Dropsy									2					2
3. Cancer														
4. Cancrum Oris (Noma) ...							3	3	7	5	9			27
5. Mortification						1								1
ORDER 2.—TUBERCULAR.														
1. Scrofula			4	3	2		1	1						11
2. Tabes Mesenterica ...			9	4	2	1								16
3. Phthisis			9	12	24	53	50	48	27	4	3	1		197
4. Hydrocephalus			9	12	8	3	2							29
Totals			22	26	20	19	38	54	51	36	10	12	1	68
CLASS.														
III. LOCAL DISEASES.														
ORDER 1.—NERVOUS SYSTEM.														
1. Cephalitis						1		1	1	3	2			8
2. Apoplexy							2	1	3	6	4	2	5	23
3. Paralysis						1		1	4	3	12	10	2	34
4. Insanity											1			1
5. Chorea														
6. Epilepsy						1	4	1	1	1	1			9
7. Convulsions		91	11	3										106
8. *Brain Diseases, &c.* ...		1	4	2		2	1	3	4	3	2			20
ORDER 2.—ORGANS OF CIRCULATION.														
1. Pericarditis														
2. Aneurism							1	2	1	1				5
3. *Heart Diseases, &c.* ...				1	4	3	13	15	16	17	7	3		79
ORDER 3.—RESPIRATORY ORGANS.														
1. Laryngitis			2	1						1				3
2. Bronchitis		42	28	8	2	3	2	2	8	28	19	3	1	77
3. Pleurisy			1				2	1			1	4		4
4. Pneumonia		29	9	12	2	6	6	5	7	10	6	3		61
5. Asthma							1	2		5	1	1		10
6. *Lung Disease, &c.* ...		3					3	2	2		3			10
ORDER 4.—DIGESTIVE ORGANS.														
1. Gastritis														
2. Enteritis		1												1
3. Peritonitis					1	3		1						5
4. Ascites									1					1
5. Ulceration of Intestines ...							1	2						3
6. Hernia		1						1				1		4
7. Ileus														
8. Intussusception		1		1				1						3
9. Stricture of Intestines ...								1		1				2
10. Fistula							3	2	2					10
11. *Stomach Disease, &c.* ...														
12. *Pancreas Disease, &c.* ...											1			1
13. Hepatitis														
14. Jaundice		2								2				4
15. *Liver Disease, &c.* ...						1	1	5	3	2	1			13
16. *Spleen Disease, &c.* ...														
ORDER 5.—URINARY ORGANS.														
1. Nephritis														
2. Ischuria														
3. Bright's Disease (Nephria) ...					3	3	3	3	7	3	1	1		24
4. Diabetes														
5. Calculus (Stone)														
6. Cystitis										1	2		1	3
7. *Kidney Disease, &c.* ...					1	1	1	3	1	1	1	1		10
ORDER 6.—ORGANS OF GENERATION.														
1. Ovarian Dropsy														
2. *Uterus Disease, &c.* ...														
ORDER 7.—ORGANS OF LOCOMOTION.														
1. Synovitis (Arthritis) ...														
2. *Joint Disease, &c.* ...						2	1							3
ORDER 8.—INTEGUMENTARY SYSTEM.														
1. Phlegmon														
2. Ulcer														
3. *Skin Diseases, &c.* ...		1											1	2
Totals		172	35	26	20	31	36	53	66	100	53	30	3	233
CLASS.														
IV. DEVELOPMENTAL DISEASES														
ORDER 1.—DISEASES OF CHILDREN.														
1. Premature Birth		40	2											42
2. Cyanosis		3												3
3. Spina Bifida		4												4
4. Other Malformations ...		1												1
5. Teething		6	5											11
ORDER 2.—ADULTS.														
1. Parturiency									2					2
2. Childbirth (*see* Puerperal Fever)						2	6	1						9
ORDER 3.—OLD PEOPLE.														
1. Old Age										3	26	9	3	50
ORDER 4.—NUTRITION.														
1. Atrophy and Debility ...		61	4							1	2			68
Totals		115	11			2	6	3		4	11	28	9	126
CLASS.														
V. VIOLENT DEATHS.														
1. Fractures and Contusions ...						2	9	6	6	5	4			32
2. Wounds { Gunshot ...														
{ Cut, Stab ...														1
3. Burns and Scalds ...			1	1	1	1							2	3
4. Poison												1		1
5. Drowning				1	2	5	6	6	6	1			3	27
6. Suffocation			1	1	1		1	1					3	6
7. Otherwise														
Order 3.—HOMICIDE ...														
Order 4.—SUICIDE ...								1	1	1	1			4
Totals		7	3	3	3	8	16	13	14	7	3	2	3	74
Causes not specified or ill defined		12	1	1		1	1	4	2	5	4	1	2	34

TABLE No. 2.

The following Table illustrates the proportionate death-rate to every 1,000 living in Cardiff compared with that of all England.

	TOTAL DEATHS.	Death Rate per 1000 Inhabitants, 1878.	Average Death Rate per 1000 Inhabitants of Kingdom, for 25 years.
CLASSES.			
I. Zymotics Diseases ...	254	3·212	5·038
II. Constitutional Diseases ...	289	3·654	4·205
III. Local Diseases ...	623	7·942	8·409
IV. Developmental Disease ...	190	2·402	3·561
V. Violent Deaths ...	74	.935	} 0·761
Not specified or ill defined ...	33	·417	
Total ...	1468	18·5	22·2
CLASS.			
I. ZYMOTIC DISEASES			
ORDER 1.—MIASMATIC			
1. Smallpox	1	0·0126	0·250
2. Measles	3	0·037	0·428
3. Scarlet Fever (Scarlatina) ...	10	0·126	0·625
4. Diphtheria	12	0·151	0·622
5. Quinsy			
6. Croup	18	0·227	0·225
7. Whooping Cough ...	70	0·897	0·496
Typhus Fever ...	6	0·075	} 0·866
8. { Enteric or Typhoid F. ...	18	0·227	
{ Simple continued F. ...	4	0·050	
9. Erysipelas	5	0·063	0·097
10. Puerperal Fever (Metria) ...			0·059
11. Carbuncle			0·01
12. Influenza			0·05
13. Dysentry	1	0·0126	0·07
14. Diarrhœa	73	0·923	0·830
15. Cholera	1	0·0126	0·119
16. Ague	1	0·0126	0·707
17. Remittent Fever ...		0·050	0·015
18. Rheumatism	4	0·050	0·109
19. Other *Zymotic* Diseases	3	0·037	0·005
ORDER 2.—ENTHETIC.			
1. Syphilis	14	0·117	0·063
2. Stricture of Urethra ...	1	0·0126	0·010
3. Hydrophobia			0·032
4. Glanders			
ORDER 3.—DIETIC.			
1. Privation			0·003
2. Want of Breast Milk ...			0·061
3. Purpura and Scurvy ...	1	0·0126	0·018
4. Alcoholism { a. Del. Tremens	1	0·0126	0·025
{ b. Intemperance	5	0·063	0·017
ORDER 4.—PARASITIC.			
1. Thrush	2	0·025	0·055
2. Worms, &c.			
Totals	254	3·212	5·038
CLASS.			
II. CONSTITUTIONAL DISEASES			
ORDER 1.—DIATHETIC.			
1. Gout	2	0·025	0·015
2. Dropsy			0·386
3. Cancer	27	0·341	0·369
4. Cancrum Oris (Noma) ...			0·007
5. Mortification	2	0·025	0·026
ORDER 2.—TUBERCULAR.			
1. Scrofula	11	0·137	0·149
2. Tabes Mesenterica ...	16	0·202	0·282
3. Phthisis	197	2·266	2·567
4. Hydrocephalus	34	0·429	0·370
Totals	289	8·654	4·206
CLASS.			
III. LOCAL DISEASES.			
ORDER 1.—NERVOUS SYSTEM.			
1. Cephalitis	8	0·100	0·128
2. Apoplexy	23	0·289	0·477
3. Paralysis	34	0·429	0·486
4. Insanity	1	0·0126	0·003
5. Chorea			0·003
6. Epilepsy	9	0·113	0·114
7. Convulsions	106	1·34	1·235
8. *Brain Diseases, &c.* ...	20	0·252	0·231
ORDER 2.—ORGANS OF CIRCULATION.			
1. Pericarditis			0·029
2. Aneurism	5	0·063	0·031
3. *Heart Diseases, &c.* ...	79	0·999	0·899
ORDER 3.—RESPIRATORY ORGANS.			
1. Laryngitis	3	0·063	0·068
2. Bronchitis	141	1·770	1·596
3. Pleurisy	4	0·050	0·043
4. Pneumonia	86	1·087	1·163
5. Asthma	10	0·126	0·393
6. *Lung Disease, &c.* ...	10	0·126	0·195
ORDER 4.—DIGESTIVE ORGANS.			
1. Gastritis			0·038
2. Enteritis	1	0·013	0·163
3. Peritonitis	5	0·063	0·077
4. Ascites	1	0·0126	0·085
5. Ulceration of Intestines ...	3	0·037	0·045
6. Hernia	4	0·050	0·042
7. Ileus			0·029
8. Intussusception	3	0·037	0·014
9. Stricture of Intestines ...	1	0·0126	0·013
10. Fistula			0·005
11. *Stomach Disease, &c.* ...	1	0·0126	0·128
12. *Pancreas Disease, &c.* ...			
13. Hepatitis	2	0·025	0·069
14. Jaundice	5	0·063	0·889
15. *Liver Disease, &c.* ...	13	0·163	0·238
16. *Spleen Disease, &c.* ...	2	0·025	0·003
ORDER 5.—URINARY ORGANS.			
1. Nephritis			0·018
2. Ischuria			0·005
3. Bright's Disease (Nephria) ...	24	0·303	0·078
4. Diabetes	3	0·037	0·028
5. Calculus (Stone)	1	0·0126	0·010
6. Cystitis	3	0·037	0·016
7. *Kidney Disease, &c.* ...	10	0·126	0·114
ORDER 6.—ORGANS OF GENERATION.			
1. Ovarian Dropsy			0·011
2. *Uterus Disease, &c.* ...			0·045
ORDER 7.—ORGANS OF LOCOMOTION.			
1. Synovitis (Arthritis) ...			0·004
2. *Joint Disease, &c.* ...	3	0·037	0·045
ORDER 8.—INTEGUMENTARY SYSTEM.			
1. Phlegmon			0·028
2. Ulcer			0·018
3. *Skin Diseases, &c.* ...	2	0·025	0·015
Totals	628	7·942	8·409
CLASS.			
IV. DEVELOPMENTAL DISEASES			
ORDER 1.—DISEASES OF CHILDREN.			
1. Premature Birth	42	0·530	0·804
2. Cyanosis	3	0·037	0·020
3. Spina Bifida	4	0·050	0·017
4. Other Malformations ...	1	0·0126	0·020
5. Teething	11	0·137	0·206
ORDER 2.—ADULTS.			
1. Parturiency	2	0·025	0·004
2. Childbirth (*see* Puerperal Fever)	9	0·113	0·118
ORDER 3.—OLD PEOPLE.			
1. Old Age	50	0·630	1·378
ORDER 4.—NUTRITION.			
1. Atrophy and Debility ...	68	0·859	1·191
Totals	190	2·402	3·561
CLASS.			
V. VIOLENT DEATHS.			
1. Fractures and Contusions ...	32	0·404	0·235
2. Wounds { Gunshot ...	1	0·0126	0·005
{ Cut, Stab ...			0·003
3. Burns and Scalds ...	3	0·037	0·066
4. Poison	1	0·0126	0·013
5. Drowning	27	0·341	0·121
6. Suffocation	6	0·063	0·056
7. Otherwise			0·010
Order 3.—HOMICIDE ...	1	0·0126	0·019
Order 4.—SUICIDE ...	4	0·050	0·064
Totals	74	0·935	} 0·226
Causes not specified or ill defined	33	·417	

Table of Deaths during the year 1878, in the Urban Sanitary District of Cardiff.

CLASSIFIED ACCORDING TO DISEASES, AGES, AND LOCALITIES AND SHOWING ALSO THE POPULATION OF SUCH LOCALITIES, AND THE BIRTHS THEREIN DURING THE YEAR.

(1.) Names of Localities (being Parishes, Groups of Parishes, Townships, Wards, or other areas of known population) adopted for the purpose of these Statistics; public Institutions being excluded.	Population at all Ages.		Registered Births.	Mortality from all causes, at subjoined Ages.							Mortality from subjoined causes, distinguishing Deaths in Persons under Five Years of Age.																				
	Census 1871.	Estimated to middle of 1878		At all ages.	Under 1 year.	1 and under 5	5 and under 15	15 and under 25	25 and under 60	60 and upwards.		Smallpox.	Measles.	Scarlatina.	Diphtheria.	Croup (not "spasmodic").	Whooping Cough.	Continued Fevers. Typhus.	Enteric or Typhoid.	Other or Double-fal.	Diarrhœa Dysentery	Cholera.	Rheumatic Fever.	Erysipelas.	Pyæmia.	Puerperal Fever.	Ague.	Phthisis.	Bronchitis, Pneumonia, and Pleurisy.	Heart Diseases.	Injuries.	Other Diseases.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.
District of Cardiff	Unknown. Present District not formed.	79073	2756	1308	404	207	62	81	334	220	Under 5		3	2	5	16	68			1	65			2				113	109	1	8	311
											5 upwds.			8	7	1	2	5	12	3	5	1	3	3	3		154	85	61	53	296
Public Institutions. Infirmary				30	1		4	5	18	2	Under 5																				1
											5 upwds								1				1				1	1	6	9	10
Hamadryad				19				6	13		Under 5																				
											5 upwds.	1							1								4	5	4	3	1
Union			37	110	14	7	1	8	48	32	Under 5					1					3						2	3			12
											5 upwds.							1	2		1					1	22	18	7	1	36
Gaol			2	1					1		Under 5																				
											5 upwds.																				1
Totals		79073	2795	1468	419	214	67	100	414	254	Under 5		3	8	5	17	68			2	68			2				15	112	1	8	323
											5 upwds.	1		2	7	1	2	6	16	3	6	1	4	3	3		1	182	109	78	66	344

The estimated population of Urban District of Cardiff is based on total number of inhabited houses, and average number of inmates found to exist in each house at censuses 1861 and 1871.

Table of Mortality and Sickness of the Urban Sanitary District of Cardiff, 1878.

FOR THE TWELVE CALENDAR MONTHS ENDING DECEMBER 31ST, 1878.

[Area of District, 7,374 Acres.

(B)

NAME OF DISEASE.	(A) Deaths (among all classes) registered as having occurred in the District or Division.		(B) Sickness and Deaths among Paupers.				(C) If there be any Hospital or other Public Medical Institution in or near the District or Division, the subjoined columns are to be filled up.					
	Total Deaths registered as above (including those entered in columns IV. and V.		Deaths of Persons who have come into the District or Division with their fatal illness upon them.		Sickness and Deaths among out-door paupers; and among any paupers who belong to the district or division, and have been removed into the Workhouse on account of illness; whether the Workhouse be within or without the District or Division.				IN-PATIENTS. Sickness and Deaths in such Institutions among inmates who belong to the District or Division.				OUT-PATIENTS. New cases of sickness among persons who are over to the District or Division, and are out-patients of Hospitals or patients of Dispensaries.	
					New Cases.		Deaths.		New Cases.		Deaths.			
	Aged under 5 years.	Aged 5 years and upwards.	Aged under 5 years.	Aged 5 years and upwards.	Aged under 5 years.	Aged 5 years and upwards.	Aged under 5 years	Aged 5 years and upwards.	Aged under 5 years.	Aged 5 years and upwards.	Aged under 5 years.	Aged 5 years and upwards.	Aged under 5 years.	Aged 5 years and upwards.
I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.
Small Pox		1								2		1		
Measles	3												8	
Scarlatina	8	2			4	3								
Diphtheria	5	7												
Croup (not spasmodic")	17	1					1							
Whooping Cough	68	2			4	1							11	2
"Continued" Fevers. Typhus		6				11		1						
"Continued" Fevers. Enteric	2	16				11		2		8		2		
"Continued" Fevers. Of other, or doubtful sort	1	3								1				
Diarrhœa and Dysentry	68	6			46	46	12	4					40	17
Cholera		1												
Rheumatic Fever		4				18		1		42		1		31
Erysipelas	2	3				3				6				
Pyæmia		3												1
Puerperal Fever										14				
Acne		1				4		1		24		5	6	60
Phthisis	15	182			2	75	4	61		42		6	5	98
Bronchitis, Pneumonia, and Pleurisy	112	109			17	114	6	31		11		10		15
Heart-Disease	1	78				35		24		238	1	12	4	349
Injuries	8	66			3	84		1	11	218	1	12	95	2890
DISEASES NOT NAMED ABOVE	323	344			156	1391	42	156						
TOTAL	633	835			237	1796	65	282	11	606	1	49	169	3563